

CLAIMS

WHAT IS CLAIMED IS:

- 5 1. A method for isolating a defined quantity of a DNA target material from other material in a medium by:
  - a. providing a medium including the DNA target material;
  - b. providing a discrete quantity of a silica-containing solid support capable of reversibly binding a definable quantity of the DNA target material;
  - 10 c. forming a complex of the silica-containing solid support and the DNA target material by combining the silica-containing solid support and the medium;
  - d. removing the complex with the DNA target material from the medium; and
  - e. separating the DNA target material from the complex, whereby a defined  
15 quantity of the DNA target material is obtained.
2. A method for isolating a defined quantity of a DNA target material from other material in a medium by:
  - a. providing a medium including the DNA target material;
  - 20 b. providing a discrete quantity of silica magnetic particles capable of reversibly binding a definable quantity of the DNA target material;
  - c. forming a complex of the silica magnetic particles and the DNA target material by combining the silica magnetic particles and the medium;
  - d. removing the complex with the DNA target material from the medium by  
25 application of an external magnetic field; and
  - e. separating the DNA target material from the complex by eluting the DNA target material, whereby a defined quantity of the DNA target material is obtained.
- 30 3. The method of claim 2, wherein the quantity of DNA target material provided in step (a) is in excess of the binding capacity of the particles.
4. The method of claim 2, wherein the silica magnetic particles are porous.

5. The method of claim 2, wherein the silica magnetic particles are nonporous.
6. The method of claim 2, wherein the silica magnetic particles are siliceous-oxide coated magnetic particles.
- 5 7. The method of claim 2 wherein the medium includes a chaotropic salt.
8. The method of claim 7 wherein the chaotropic salt comprises guanidine thiocyanate.
- 10 9. The method of claim 2, wherein the DNA target material provided in step (a) is the product of a polymerase chain reaction.
- 10 10. The method of claim 2 wherein the DNA target material is genomic DNA.
- 15 11. The method of claim 2 wherein the DNA target material is plasmid DNA.
12. The method of claim 10 further comprising analyzing the eluted genomic DNA in a DNA typing process.
- 20 13. The method of claim 2 wherein the medium is a solid support containing the DNA target material and wherein the DNA target material is isolated from the solid support prior to step (c) by combining the solid support with a mixture comprising a chaotropic salt.
- 25 14. The method of claim 13 wherein the solid support is a paper.
15. The method of claim 13 wherein the mixture is heated to a temperature of from about 60° to about 100°C.
- 30 16. The method of claim 2 further comprising sequencing at least a portion of the eluted DNA target material.
17. The method of claim 2, further comprising a step of washing the complex after

removal from the medium, before eluting the DNA target material from the complex.

18. The method of claim 17, wherein the complex is washed using a wash solution comprising an alcohol and a salt.

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19. The method of claim 2, wherein the DNA target material eluted in step (e) is eluted with water.

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20. A method of isolating a defined quantity of a DNA target material from other materials in a medium comprising the steps of:

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- a. providing a medium containing the DNA target material;
- b. providing a discrete quantity of silica magnetic particles with the capacity to reversibly bind a definable quantity of the DNA target material per milligram of particle;
- c. forming a mixture comprising the medium, the silica magnetic particles, and a chaotropic salt, wherein the chaotropic salt concentration in the mixture is sufficient to cause the DNA target material to adhere to the particles;
- d. incubating the mixture until at least some of the DNA target material is adhered to the silica magnetic particles;
- e. removing the silica magnetic particles and the adhered DNA target material from the mixture using an external magnetic force; and
- f. eluting the DNA target material from the silica magnetic particles by exposing the particles to an elution solution.

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21. The method of claim 20 wherein the quantity of DNA target material provided in step (a) is in excess of the binding capacity of the particles.

22. The method of claim 20 wherein the DNA target material is genomic DNA.

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23. The method of claim 20 wherein the DNA target material is plasmid DNA.

24. The method of claim 20 further comprising sequencing at least a portion of the eluted DNA target material.

25. The method of claim 20, wherein the chaotropic salt comprises guanidine thiocyanate.
- 5 26. The method of 20, wherein the concentration of chaotropic salt in the mixture formed in step (c) is between about 0.1 M and 7 M.
27. The method of claim 20 wherein the silica magnetic particles are porous.
- 10 28. The method of claim 20 wherein the silica magnetic particles are nonporous.
29. The method of claim 20, further comprising a step of washing the silica magnetic particles after removal from the medium, before eluting the DNA target material from the particles.
- 15 30. The method of claim 29, wherein the particles are washed using a wash solution comprising an alcohol and a salt.
31. The method of claim 20 wherein the elution solution is water.
- 20 32. A kit for isolating a defined quantity of a DNA target material from a medium, the kit comprising:  
a discrete quantity of silica magnetic particles suspended in an aqueous solution in a first container, wherein the particles have the capacity to reversibly bind a definable quantity of the DNA target material from the medium for a sample type.
- 25 33. The kit of claim 32 wherein the sample type is liquid blood.
- 30 34. The kit of claim 32 wherein the sample type is blood on a solid support.
35. The kit of claim 32, further comprising a chaotropic salt.
36. The kit of claim 35 wherein the silica magnetic particles are suspended in a

solution with the chaotropic salt.

37. The kit of claim 35 further comprising a wash solution.
- 5 38. A method of determining a calibration model for quantitating a DNA target material in a sample type of interest, the method comprising:
- a. providing a first medium, wherein the first medium includes a discrete quantity of the sample type of interest;
  - 10 b. providing a second medium, wherein the second medium includes a different discrete quantity of the sample type of interest;
  - c. mixing a discrete quantity of silica magnetic particles with the first medium, wherein the silica magnetic particles are capable of reversibly binding a defined quantity of the DNA target material, thereby forming a first complex of the silica magnetic particles and the DNA target material from the first medium;
  - 15 d. mixing a discrete quantity of silica magnetic particles with the second medium, wherein the silica magnetic particles are capable of reversibly binding a defined quantity of the DNA target material, thereby forming a second complex of the silica magnetic particles and the DNA target material from the second medium;
  - 20 e. removing the first complex from the first medium and the second complex from the second medium by application of an external magnetic field;
  - f. separately eluting the DNA target material from the first complex and second complex, producing a first eluent of isolated DNA target material from the first complex and a second eluent of isolated DNA target material from the second complex; and
  - 25 g. determining the amount of DNA target material in the first eluent and in the second eluent.
- 30 39. The method of claim 38 wherein the discrete quantity of particles provided in step (c) is the same quantity as the discrete quantity of particles provided in step (d).
40. A method of isolating DNA target material from a solid support, the method comprising: contacting the solid support containing the DNA target material with

a chaotropic salt solution at a temperature of about 60°C to about 100°C thereby isolating at least a portion of the DNA target material from the solid support.

41. The method of claim 40 wherein the solid support is a paper.  
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42. The method of claim 40 wherein the chaotropic salt solution comprises a chaotropic salt and a pH buffer.
43. The method of claim 40 further comprising the step of isolating a defined quantity  
10 of DNA target material by adding a discrete quantity of silica magnetic particles to the isolated DNA target material to form a complex; removing the complex with the DNA target material from the solution by application of an external magnetic field; and separating the DNA target material from the complex by eluting the DNA target material, whereby a defined quantity of the DNA target material is  
15 obtained.